

IDENTIFICATION OF HAZARDOUS WASTES IN LTCFs

PART I



Colorado Department
of Public Health
and Environment

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<http://www.colorado.gov/cdphe/medicalwaste>



Waste Universe

SOLID WASTE

(Regulated by CDPHE, HMWMD)

Non-RCRA
Hazardous
Waste Drugs

DEA
Controlled
Substances

RCRA Hazardous Waste

- D-Codes
- P-Listed
- U-Listed
- Universal Waste
- Used Oil

Sharps &
Biohazard
Waste

HEALTH
FACILITIES

WATER

AIR

LOCALS

OSHA

U.S.
DOT

CDC

JCAHO

CLIA

RCRA Definition of a Hazardous Waste

6 CCR 1007-3, Section 261.3

A hazardous waste is a solid, a liquid or a contained gaseous material that is no longer used and that no longer serves the purpose for which it was produced, and could pose dangers to human health and the environment after it is discarded.

Hazardous Waste Generators

Must ensure that the hazardous waste is disposed of at a permitted hazardous waste disposal facility.

Other regulations apply depending on your generator category.

Hazardous Waste Generator Categories

- Conditionally-Exempt Small Quantity Generators (CESQG)
- Small Quantity Generators (SQG)
- Large Quantity Generators (LQG)

Waste medications can be characteristic and/or listed as hazardous wastes.



Characteristic Waste Codes

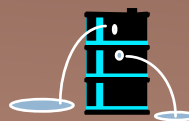
Applicable 6 CCR 1007-3 Subpart C

Display one or more of the four generic hazardous properties:

- Ignitable (D001)



- Corrosive (D002)



- Reactive (D003)



- Toxic (D004 → D043)



Ignitable (D001) Characteristic Hazardous Wastes



- Aqueous drug formulation containing 24% or more alcohol by volume
- Liquid with flash point $< 140^{\circ}\text{F}$
- Flammable aerosol propellants meeting the DOT definition of compressed gas
- Example: rubbing alcohol

6 CCR 1007.3 Section 261.24

Table 1: Maximum Concentration of Contaminants for the Toxicity Characteristic

Waste Code Concentration	Contaminant	Maximum
D004	Arsenic	5 mg/L
D005	Barium	100 mg/L
D007	Chromium	5 mg/L
D009	Mercury	0.2 mg/L
D010	Selenium	1 mg/L
D011	Silver	5 mg/L
D013	Lindane	0.4 mg/L

Examples of Toxic (D004-D043) Characteristic Hazardous Wastes



D024-M-cresol (200 mg/L)

- Insulin w/cresol
- Also may be U-listed

Examples of Toxic (D004-D043) Characteristic Hazardous Wastes

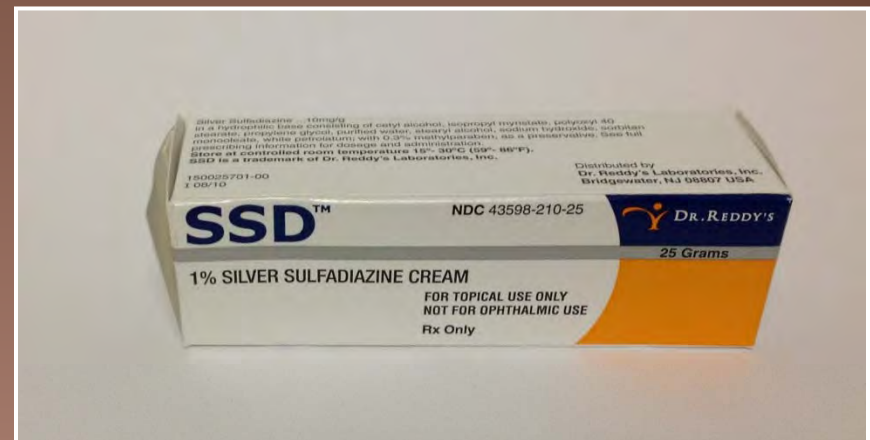


D009-Mercury (0.2 mg/L)

- Any drug w/thimerosal or phenylmercuric acetate (eye drops, nasal spray, some multi dose vaccines, etc.)
- Also may be P-listed



Lindane Shampoo
 > 0.4 mg/L of lindane



Silver Sulfadiazine Cream
 > 5 mg/L of silver

The MSDS

(Material Data Safety Sheets)

MSDS are required by OSHA and must list the hazardous chemicals that are found in a product in quantities of 1% or greater, or 0.1% or greater if the chemical is a carcinogen.

1% = 10,000 parts per million (ppm)

Example: A waste that leaches lead at 5 ppm meets the definition of a hazardous waste.

Moving from % to ppm to mg/L

- ppm = mg/l
- 100% = 1,000,000 parts per million (ppm)
- 10 % = 100,000 parts per million (ppm)
- 1% = 10,000 parts per million (ppm)
- 0.1% = 1,000 parts per million (ppm)
- 0.3 % m-cresol = 3,000 ppm

Using the MSDS to Determine Concentrations of a Characteristic Hazardous Waste

Novo Nordisk A/S	DIRECTIONS FOR USE / MATERIAL SAFETY DATA SHEET according to 91/155/EEC
	Novolin® R (regular, human insulin injection [recombinant DNA origin])

Trade name	Novolin® R	CAS-no.	11061-68-0 (active substance)
Chemical name	Aqueous solution for injection containing insulin human, recombinant.	EC-no.	
Novo Nordisk item no.			
Company	Novo Nordisk Inc. 100 College Road West, Princeton, New Jersey 08540 USA		
Emergency telephone no.			

COMPOSITION / INFORMATION ON CONTENTS 2

Hazardous ingredients	Concentration	Classification
108-39-4 m-Cresol	0,30 % (w/v)	T;R24/25 C;R34

HAZARDS IDENTIFICATIONS 3

Potential Health Effects	Inhalation of aerosols may result in a mild temporary decrease of the blood sugar level (hypoglycaemia). Skin and eye contact may cause mild irritation. Exposure to Novolin® R is not known to cause adverse health effects.
Inflammatory Properties	Novolin® R is not combustible.

FIRST AID MEASURES 4

After swallowing	Rinse out mouth thoroughly with water and give plenty of water to drink. Do NOT provoke vomiting. Seek medical advice if symptoms persist.
Skin contact	Remove contaminated clothes and wash contaminated skin thoroughly with plenty of water for at least 15 minutes. Seek medical advice if symptoms persist.
Eyes	Rinse the eye immediately with plenty of water for at least 15 minutes with the eyelid held wide open. Seek medical advice if symptoms persist.
Inhalation	Go outside to breathe fresh air.

PRECAUTIONS IN CASE OF FIRE 5

No special precaution.

Continued

COMPOSITION / INFORMATION ON CONTENTS

Hazardous ingredients	Concentration	Classification
108-39-4 m-Cresol	0,30 % (w/v)	T;R24/25 C;R34

Listed Hazardous Waste

Chemicals that present a threat to human health or the environment when disposed of include:



- U-Listed (medications)
- P-Listed (medications)
- F-Listed (solvents)

U-Listed Wastes – Toxic Wastes

6 CCR 1007-3 261.33

Hazardous Waste No.	Chemical Abstract No.	Substance	Common Name
U015	115-02-6	L-Serine; diazoacetate (ester)	Azarserine
see F027	93-72-1	Silvex (2, 4, 5-TP)	Same
U206	18883-66-4	Streptozotocin	Same
U103	77-78-1	Sulfuric acid; dimethyl ester	Dimethyl sulfate
U189	1314-80-3	Sulfur phosphide (R)	Phosphorus pentasulfide

CAS Number vs. NDC

CAS

Chemical Abstract Number

NDC

National Drug Code

The P and U listings are based on the active ingredient associated with the Chemical Abstract Number.

If you use the National Drug Code (NDC) instead of the Chemical Abstract Number, make sure to cross reference the NDC with the CAS.

Using the MSDS to Assist in the Identification of P & U Listed Hazardous Waste

(Example of a toxic hazardous waste U206 – Streptozocin)

Material Safety Data Sheet
Streptozocin, 97%

ACC# 98283

Section 1 - Chemical Product and Company Identification

MSDS Name: Streptozocin, 97%
Catalog Numbers: AC315020000, AC315021000
Synonyms: 2-Deoxy-2-(3-methyl-3-nitrosoureido)-D-glucopyranose
Company Identification:
Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410
For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
18883-66-4	Streptozocin	97%	242-646-8

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: pale yellow solid.
Caution! May cause eye and skin irritation. May cause respiratory and digestive tract irritation. Cancer suspect agent. May cause cancer in humans. May cause liver and kidney damage. May cause adverse reproductive effects based upon animal studies.
Target Organs: Kidneys, liver.

Potential Health Effects
Eye: May cause eye irritation.
Skin: May cause skin irritation.
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause anemia, leukopenia (reduction in the number of white blood cells in the blood), and thrombocytopenia. May cause systemic effects including renal dysfunction and impaired liver function.
Inhalation: May cause respiratory tract irritation.
Chronic: May cause cancer in humans.

CAS#	Chemical Name	Percent	EINECS/ELINCS
18883-66-4	Streptozotycin	97%	242-646-8

Examples of U Codes

- **U010**
(Mitomycin C, Mitomycin; Mutamycin)
- **U035**
(Chlorambucil, Leukeran)
- **U058**
(Cyclophosphamide, CTX; Lymphoplatin/VHA Plus; Neosar; Procytox)

P-Listed Hazardous Waste



- 2.2 lbs. or more of acute (P-listed) hazardous waste = LQG
- Empty containers that held P-listed drugs are hazardous wastes
- If containers are triple-rinsed, the rinsate must be managed as a hazardous waste

P Wastes – Acute Hazardous Wastes

6 CCR 1007-3 261.33

Hazardous Waste No.	Chemical Abstract No.	Substance	Common Name
P127	1563-66-2	7-Benzofuranol, 2, 3-dihydro-2, 2-dimethyl, methylcarbamate	Carbofuran
P188	57-64-7	Benzoic acid, 2-hydroxy-compd. With (3aS-cis)-1, 2, 3, 3a, 8, 8a-hexahydro-1, 3a, 8-trimethylpyrrolo [2, 3b]indol-5-yl methylcarbamate ester (1:1)	Physostigmine, salicylate
P001	81-81-2	2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenylbutyl)-, and salts, when present at concentrations greater than 0.3%	Warfarin salts, when present at concentrations greater than 0.3%

Material Safety Data Sheet (MSDS)

Safety data for warfarin



[Glossary of terms on this data sheet](#)

The information on this web page is provided to help you to work safely, but it is intended to be an overview of hazards, not a replacement for a full Material Safety Data Sheet (MSDS). MSDS forms can be downloaded from the web sites of many chemical suppliers.

General

Synonyms: 4-hydroxy-3-(3-oxo-1-phenylbutyl)coumarin, 4-hydroxy-3-(3-oxo-1-phenylbutyl)-2H-1-benzopyran-2-one, Tox-Hid, Warf, Warfarat, co-r-tox, co-rax, d-con, dethmor, mar-fin, rattunal, rax, rodex, rosex, solfarin, coumafene, 3-(a-acetonylbenzyl)-4-hydroxy-Coumarin, Warfarin-alcohol, (RS)-Warfarin, 1-(4'-Hydroxy-3'-coumarinyl)-1-phenyl-3-butanone, 3-(a-Acetonilybenzyl)-4-hydroxycoumarin, 3-(a-Phenyl-b-acetylethyl)-4-hydroxycoumarin, 3-(1'-Phenyl-2'-acetylethyl)-4-hydroxycoumarin, 4-Hydroxy-3-(3-oxo-1-phenylbutyl)-2H-chromen-2-one, Athrombine-K, Brumolin, coumadin, Coumafen, Coumaphen, Coumefene, DL-3-(a-Acetonilybenzyl)-4-hydroxycoumarin, dethmor, dethnel, fasco fascat powder, Kumader, Kumadu, Kumatox, rac-Warfarin, maveran, rattox, rat-mix, rat-o-cide, Ratron, Ratron G, Rodafarin, Rodafarin C, Temus W, Vampirinip II, Vampirinip III, W.A.R.F. 42, WARF compound 42, Warfarin, Zoocoumarin, numerous further names
Use: anticoagulant, rodenticide
Molecular formula: $C_{19}H_{16}O_4$
CAS No: 81-81-2 (old CAS numbers 56573-89-8, 5543-56-6)
EINECS No:

Physical data

Appearance: solid
Melting point: 161 - 162 C
Boiling point: decomposes
Vapour density:
Vapour pressure:
Density ($g\ cm^{-3}$):
Flash point:
Explosion limits:

Autoignition temperature:
Water solubility: 1.7 mg/100 ml at 20 C

Stability

Stable. Incompatible with strong oxidizing agents.

Toxicology

Very toxic if swallowed or inhaled. Causes internal hemorrhage. Toxic if absorbed through the skin. May act as a teratogen.

Toxicity data

(The meaning of any toxicological abbreviations which appear in this section is given [here](#).)

ORL-RAT LD50 3 mg kg^{-1} to 186 mg kg^{-1}
SKN-RAT LD50 1400 mg kg^{-1}
ORL-MUS LD50 60 mg kg^{-1}
ORL-HMN LDLO 7 mg kg^{-1}
ORL-MUS LD50 374 mg kg^{-1}

Risk phrases

(The meaning of any risk phrases which appear in this section is given [here](#).)
R24 R26 R28 R48 R61.

Transport information

(The meaning of any UN hazard codes which appear in this section is given [here](#).)

Personal protection

Safety glasses, gloves. Take care to avoid breathing dust.

Safety phrases

(The meaning of any safety phrases which appear in this section is given [here](#).)
S24 S25 S45 S53.

[Return to [Physical & Theoretical Chemistry Lab Safety home page](#)]

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MSDS Characterization of Waste

(Example of an acute hazardous waste P001 – Warfarin)

Safety data for warfarin



[Glossary](#) of terms on this data sheet

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Use: anticoagulant, rodenticide

Molecular formula: $C_{19}H_{16}O_4$

CAS No: 81-81-2 (old CAS numbers 56573-89-8, 5543-56-6)

EINECS No:

Physical data

Appearance: solid
Melting point: 161 - 162 °C
Boiling point: decomposes
Vapour density:
Vapour pressure:
Density (g cm⁻³):
Flash point:
Explosion limits:

CAS No: 81-81-2 (old CAS numbers 56573-89-8, 5543-56-6)
EINECS No:

Example of RCRA P-Listed Waste Codes



- **P001**
(Warfarin and salts [concentration > 0.3%]; Coumadin, Warfarin)
- **P012**
(Arsenic trioxide; Trisenox)
- **P075**
(Nicotine and salts; Nicotine patches, Habitrol, Nicoderm, Nicorette, Nicotrol, Tetrahydronicotyrine)

Some Pharma FAQs

- Epinephrine salts are not P042 hazardous waste in Colorado
- Medicinal nitroglycerin is generally not reactive (i.e. not P081 hazardous waste) but 5mg/ml concentration may be ignitable (D001)
- For controlled substances that are also hazardous wastes, follow DEA guidelines for disposal
- Sharps are not considered hazardous waste

Waste from Facilities Maintenance

Mercury-containing fluorescent lamps may be managed as universal waste.

- Can't go in the dumpster
- Label properly, use adequate container, send to authorized facility
- Mail-back programs may be appropriate



“Universal Waste Lamps”

Waste from Facilities Maintenance

Waste electronics may be managed as universal waste.

- Can't go in the dumpster
- Label properly, use adequate container, send to authorized facility
- Long-term care facility may transport own e-waste



Waste from Facilities Maintenance

Used oil

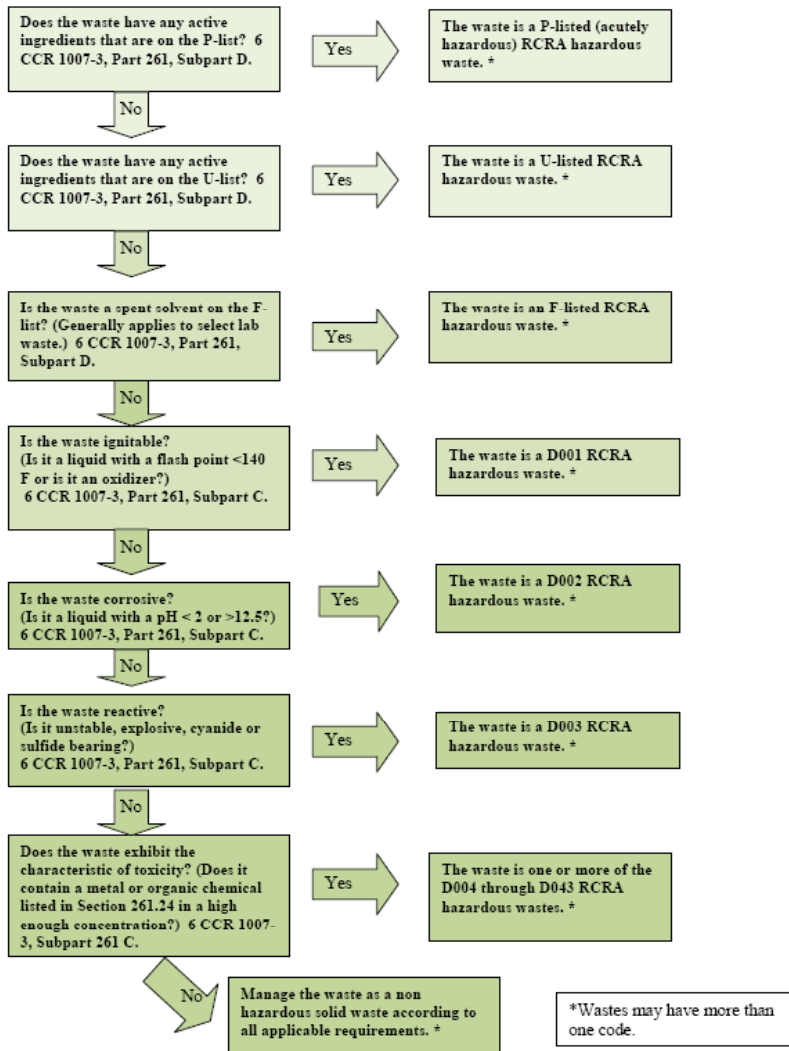
- Must go to an authorized facility
- Must be kept in closed containers labeled as “used oil”
- Facilities with the same owner may consolidate used oil in some situations



Evaluation Tool

Is your health care waste a RCRA hazardous waste?

**Begin
Here**



*Wastes may have more than one code.



<http://www.colorado.gov/cdphe/medicalwaste>